ABSTRACT

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How fast can we multiply matrices?

Ever since Strassen's discovery of an $O(n^{2.81})$-algorithm for the multiplication of $n \times n$-matrices in the late 1960's, the question about fast matrix mutiplication algorithms has served as a leading problem in the field of algebraic complexity theory. An important measure for the asymptotic complexity of this problem is the *exponent of matrix multiplication* denoted by ω. Informally speaking, it is the infimum over all real numbers γ such that $n \times n$-matrix multiplication can be achieved with $O(n^{\gamma})$ arithmetic operations. It is easily seen that $\omega \geq 2$ and Strassen's algorithm implies that $\omega \leq 2.81$. Starting from this algorithm, we will report in this talk about the main mathematical ideas leading to the "world record" $\omega < 2.38$ obtained by Coppersmith and Winograd in 1987, and sketch some of the proofs.